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Exploring the Gender Differences in Technology Use for Educational Purposes at Home Among Students in Pakistan

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Abbreviations and acronyms

ASER	Annual Status of Education Report
MoFEPT	Ministry of Federal Education and Professional Training
ISPs	Internet Service Providers
GSMA	Global System for Mobile Communications Association
FIA	Federal Investigation Agency
PECA	Prevention of Electronic Crimes Act

Executive summary

This report aims to inform policymakers, educators, and stakeholders about the critical steps needed to create a more inclusive and equitable EdTech environment in Pakistan. The Covid-19 pandemic underscored the critical role of educational technology (EdTech) in supporting student learning, particularly in low- and middle-income countries. However, significant gender disparities in access to and adoption of EdTech remain, limiting its potential impact on learning outcomes. In Pakistan, these disparities are particularly pronounced, with female students often facing greater barriers to utilising EdTech effectively.

Drawing on perspectives from teachers and EdTech stakeholders arising from a survey of over 2,000 teachers and six interviews in Islamabad, this report explores the perceived gender differences in EdTech use by students at home in Pakistan. It highlights the sociocultural norms and parental attitudes that contribute to these disparities. While technology offers the potential to bridge educational gaps, the report identifies challenges such as low digital literacy among parents and students, and the affordability of devices and internet access, which hinder equitable access to EdTech.

These findings emphasise the need for targeted interventions that address both infrastructural and sociocultural barriers to ensure that EdTech can be effectively leveraged by all students, regardless of gender. Infrastructural barriers include limited access to affordable internet services, lack of digital devices in low-income households, and unreliable electricity in remote areas. Sociocultural barriers encompass gender stereotypes that discourage girls from engaging with technology, restrictive social norms limiting girls' mobility and online presence, low digital literacy among parents, especially mothers, and parental scepticism toward girls using technology for educational purposes.

The insights presented in this report provide a clear roadmap for reducing gender disparities in technology use, improving access to digital learning tools, and enhancing educational outcomes for all students. Key recommendations include:

- Improving affordability and access: Partnering with Internet Service Providers (ISPs) and telecom companies to offer subsidised data plans for educational apps and expand device distribution programmes in underserved areas.

- Raising parental awareness and digital literacy: Implementing community-based campaigns and training programmes to educate parents on the benefits and safe use of EdTech, particularly for girls.
- Encouraging inclusive participation: Organising gender-inclusive EdTech competitions and workshops to inspire girls to engage with technology.
- Strengthening online safety: Enhancing cyberspace laws and enforcement mechanisms to create a safer digital environment for female students.
- Promoting female role models in the media: Launching media campaigns that showcase women excelling in technology to challenge societal stereotypes.

By addressing these barriers through coordinated policy actions, Pakistan can bridge the gender gap in EdTech adoption and ensure equitable access to quality education for all learners.

Introduction

The Covid-19 pandemic disrupted the global educational landscape, with Pakistan being one of the most affected countries, where long school closures impacted over 40 million students (↑UNICEF, 2020). During this time, as schools worldwide shut down and in-person learning was no longer viable, the importance of effectively utilising digital technology in education became evident. Several studies have explored whether the use of technology in education has a differential impact on the learning outcomes of female and male students (↑Chang et al., 2014; ↑Klisch et al., 2012). In Pakistan, it is estimated that 22.8 million students are out of school (↑Aepam, 2018), and even before the pandemic, 11 million girls were known to be out of school (↑ASER Pakistan, 2021). The pandemic further weakened the education system, increasing school dropouts.

In response to the pandemic and subsequently its effect on learning, the Government of Pakistan developed educational initiatives as alternatives to in-person learning, focusing on delivering education through digital technologies to students at home (↑Tabassum et al., 2020). The school closures during the pandemic highlighted the need for EdTech and its potential to enhance student learning, prompting the launch of several initiatives, including the TeleSchool App in 2023 (↑Sheikh & Nadeem, 2023).

Despite the government's recent efforts to enhance access to digital learning tools and advance digitisation within education, Pakistan continues to face significant natural, structural, political and social challenges. There is limited evidence on the academic benefits of these tools for students and uncertainties regarding their differential impact on male and female learners. This study addresses these gaps by examining the perceived utilisation and accessibility of EdTech among secondary school students in Pakistan, with a specific focus on gender dynamics. Drawing on the perspectives of teachers and public EdTech stakeholders, the study explores how technology is used by male and female students at home. It also considers the role of gender in shaping parental attitudes and student motivation towards adopting technology for learning. The study focuses on Islamabad, the capital of Pakistan, as Islamabad is the region where the highest number of EdTech interventions have been rolled out in recent years.

1.1 Rationale and research questions

A wealth of research highlights the critical role of educational technology (EdTech) in enhancing student learning outcomes, especially during

disruptions such as the Covid-19 pandemic (↑Watson et al., 2023). The pandemic intensified the reliance on digital tools for education, revealing both their potential benefits and limitations. While advanced EdTech tools can improve learning, their effectiveness is not uniform across different student groups (↑Gorard et al., 2016; ↑Luckin et al., 2012). Notably, research has pointed out that gender differences can significantly influence access to and the impact of these technologies. For example, ↑Klisch et al. (2012) review how gender affects technology use and learning outcomes, while ↑Chang et al. (2014) explore the differential impacts of EdTech on male and female students. ↑Eroglu & Senol (2021) also find that gender disparities in engagement and learning outcomes persist in digital education environments. Despite these insights, comprehensive studies on gender differences in EdTech usage in the context of Pakistan remain scarce.

This study aims to address these gaps by exploring gender dynamics in EdTech usage among secondary school students in Pakistan. It builds on existing literature by examining perceptions of how male and female students use technology for educational purposes at home and whether these practices vary based on gender. Insights from teachers and public EdTech stakeholders are crucial for understanding these dynamics and informing future policy and practice.

1.2 Research questions

In light of the existing literature and the identified gaps, this study seeks to answer the following research questions:

RQ1: What are teachers' perceptions of technology use by female and male students at home? Are there any significant gender differences in technology access or adoption? If so, how do teachers explain such differences?

RQ2: Do teachers believe that parental attitudes toward their children's utilisation of technology at home for educational purposes vary according to gender? If so, what are the underlying factors perceived as influencing these differences?

RQ3: Do governmental EdTech stakeholders perceive gender differences in technology adoption and utilisation by students, as well as the challenges, within home environments? If so, what are the underlying factors perceived as influencing these differences?

RQ4: What do teachers and governmental EdTech stakeholders think the government should do to minimise gender differences, if any exist, in technological adoption for education among students at home?

2. Literature review

This section examines the literature on the use of digital technologies in education by both female and male students in Pakistan, with a particular emphasis on the gender nuances in EdTech usage. While it considers studies from the past 15 years across Global North and South contexts, sections 2.2 and 2.3 primarily focus on research from South Asia with a specific emphasis on Pakistan, where the study is situated.

2.1 Pakistan's educational context and gender inequity

In the 2023 World Economic Forum's (WEF) Global Gender Gap Report, Pakistan was ranked 142 out of 146 countries overall and 138 out of 146 on the educational attainment index (↑WEF, 2023). According to UNICEF, while only 7% of adolescent boys in Pakistan are not in education, employment, or training, a stark 43% of adolescent girls lack any such opportunity (↑Avdeenko & Frölich, 2021). Female students disproportionately suffer more than male students across all levels of education in Pakistan. EduFinance's Covid-19 impact assessment revealed that out of a sample of 1,188 parents, 63% stated they did not plan to send their daughters back to school, while 94% said they would send their sons back when schools fully reopened (↑EduFinance, 2020).

A study by ↑Khan & Ahmed (2021) found that the pandemic led to a significant decrease in Learning Adjusted Years of Schooling (LAYS) in Pakistan, with girls experiencing a more pronounced decline than boys. During the pandemic, the Government of Pakistan implemented various online learning strategies, leveraging technology such as television, radio, and smartphones to mitigate learning disruptions. However, many students, especially marginalised girls, faced significant barriers to accessing these online learning resources. A summary report showed that fewer girls (59%) than boys (68%) reported having access to smartphones. Moreover, girls were almost 40% more likely than boys to say they never had access to a mobile device, with the most frequently cited reason being the fear of asking for one (↑Denham et al., 2020)

2.2 Gendered nature of challenges to the effective use of EdTech in Pakistan

Over the past two decades, numerous scholars have highlighted systemic gender disparities in various aspects of life in Pakistan, including

technology use. The digital gender divide is substantial, though often invisible. This divide manifests as a disturbing inequality between male and female school students. Studies have consistently shown that women face greater obstacles than men in accessing, effectively utilising, and participating in technological experiences (↑Ahmad et al., 2018; ↑Siegmann, 2009). For example, according to the GSMA's 2023 Mobile Gender Report, Pakistani women are 53% less likely than men to own a smartphone and 38% less likely to use mobile internet (↑Jeffrie, 2023). A recent study revealed that while Pakistan's 2018 digital divide policy incorporates measures emphasising the importance of ICT-related education for girls and women to narrow the digital gender gap, significant challenges and barriers continue to hinder their adoption of technology (↑Jumani et al., 2022).

While both boys and girls in Pakistan face challenges regarding the adoption of educational technology, girls are disproportionately affected by gender stereotypes, sociocultural norms, and digital illiteracy (↑Shanahan, 2021). In societies like Pakistan and Afghanistan, characterised by restrictive gender norms, girls' access to technology is heavily influenced by sociocultural dynamics. Research indicates that household technology in these contexts is often reserved for and controlled by men and boys (↑Fry & Lei, 2020). In Pakistan, social norms often result in restrictions on women's access to technology, with women frequently denied the opportunity to own digital devices or access the internet without permission from male family members, reflecting the influence of strict gender and cultural norms (↑Adeel et al., 2017). A cultural preference for male over female education further reinforces these restrictive attitudes, limiting women's and girls' access to technology (↑McGrath & Sinclair, 2013; ↑Shanahan, 2021).

Despite widespread mobile phone penetration, women and girls in Pakistan today continue to face significant barriers to engaging in telecommunications. These include the need for permission from male household members to make phone calls, restrictions on mobility required to receive network signals, and societal stigma surrounding the use of mobile phones and other technologies by females. The wide gender disparity in access to education is another key constraint to the effective use of technology. According to Shanahan (2021), familial disapproval of women's and girls' access to and use of technology is a leading factor contributing to the gender digital gap in Pakistan. This disapproval extends to the domain of technology use in education. A report by UNESCO and the World Bank found that access to technology during school closures and remote learning was not equitable, and even in households where technology is available, girls may still lack access to it (↑UNESCO et al., 2021).

2.3 Targeted EdTech interventions to address the gender gaps in learning

Numerous targeted interventions utilising technology have been piloted to support girls' education in Pakistan. As part of the Covid-19 response and within the framework of the longer-term Global Education Challenge project, 'Leave No Girl Behind,' a study conducted by ↑Raza (2022) specifically focused on the use of radio as a form of 'low-tech' technology to compare pre- and post-learning outcomes. The study targeted out-of-school girls in Balochistan, an area with notable educational challenges. The initiative involved daily 45-minute radio broadcasts, supplemented with hygiene kits and printed educational materials. Additionally, the girls received provisions such as food, stationery, and colouring pictures of fictional radio characters. The broadcasts were aired twice daily, ensuring widespread access to educational content. The intervention yielded positive results, with significant gains in literacy, numeracy, civic education, and indigenous craft making, as indicated by comparisons between pre- and summative assessments. However, it is important to note that other variables, such as the provision of food, stationery, and hygiene kits, may have also contributed to these outcomes.

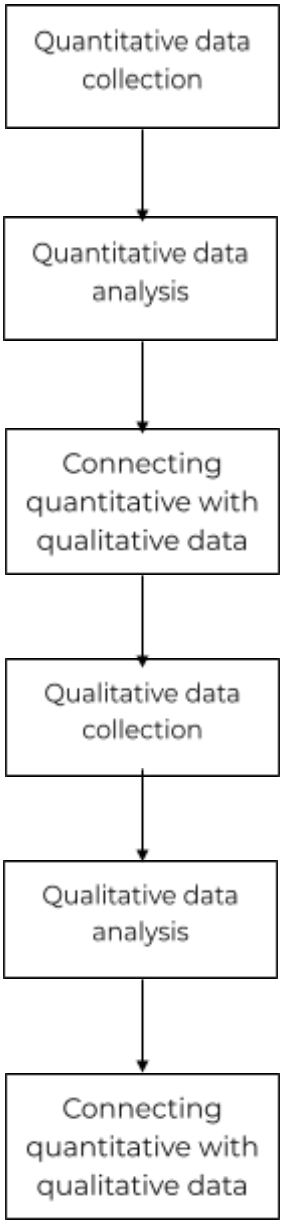
One of the most effective approaches for narrowing the gender gap in education is the adoption of online education (↑Shahzadi, 2019). Online education is particularly beneficial for reaching marginalised girls in rural areas who lack access to formal quality schooling. A recent World Bank report highlighted that rural Pakistan has nearly 130,000 primary schools for girls, but only 33,000 middle schools, resulting in limited education options for middle-school-aged female students in rural areas after completing primary school (↑Bend & Baron, 2023). Coupled with social and cultural norms that restrict girls' mobility, this lack of educational options often leads to high dropout rates among girls in rural areas. Remote online learning presents a compelling solution, potentially enabling middle-school-aged girls in these regions to stay enrolled and achieve better learning outcomes, provided they have access to technology and the internet. A recent report by the Young Lives project (↑Scott et al., 2020) highlighted the effectiveness of teacher-led online classes in Vietnam, where girls exhibited higher participation rates than boys. Therefore, it can be inferred that online education and remote learning can enhance learning outcomes for girls not only in formal school settings and urban areas, but also for marginalised girls in rural, underdeveloped regions with limited access to quality education.

Despite numerous studies highlighting the potential of EdTech to support girls' education in low- and middle-income countries, there remains a dearth of evidence and robust data to substantiate this claim, particularly within the context of Pakistan. The literature on the impact of EdTech on girls' education is sparse, and rigorous evaluations seldom delve into gender-based differences.

3. Research design and methodology

This study employed a mixed-methods sequential explanatory design, beginning with a quantitative phase followed by a qualitative phase (↑Bazeley, 2018; ↑Ivankova et al., 2006). The initial phase involved the analysis of data from the T4 Education Teachers survey conducted in Pakistan. Based on the findings from this analysis, semi-structured interviews were developed for the qualitative phase. These interviews were conducted simultaneously with teachers and government EdTech stakeholders and were later analysed using a thematic analysis. This approach was chosen to gain a comprehensive understanding of how teachers and governmental EdTech stakeholders perceive the use of technology by male and female students for educational purposes at home. The qualitative data aimed to explore the subjective realities and perspectives of participants regarding the use of EdTech by students. The quantitative data from the teacher survey provided an objective basis for understanding gender-based differences in technology usage and parental attitudes towards children's learning. Figure 1 below portrays the framework used for the sequential explanatory design.

Figure 1. *Visual model for mixed-methods explanatory sequential design procedure*

Phase	Procedure	Outcome
	■ T4 Teacher Survey in Pakistan ■ Data screening ■ Data visualisation ■ Data analysis ■ Sampling ■ Developing interview questions ■ Online semi-structured interviews with 6 participants ■ Coding using NVivo 14.0 software ■ Thematic analysis ■ Explanation and interpretation of results from quantitative and qualitative analysis	■ Numerical data from Pakistan ■ Descriptive analysis ■ Visual analysis ■ Semi-structured interview guide ■ Interview protocol ■ Interview transcripts ■ Codes and themes ■ Themes under different categories ■ Discussion ■ Policy implications ■ Future research

3.1 The quantitative phase: Secondary analysis of survey data

This study used a mixed-methods approach to explore gender disparities in EdTech usage in Pakistan's public (government) schools. The quantitative phase analysed data from the 2021 T4 Education survey of 2,365 Pakistani teachers, using descriptive statistics to examine gender-related EdTech use. The qualitative phase involved thematic analysis of interviews with four public school teachers and two EdTech stakeholders from the Ministry of Federal Education and Professional Training (MoFEPT), providing deeper insights into EdTech implementation. While the quantitative data revealed broad trends, the qualitative findings offered contextual understanding, though limited by a small, Islamabad-based sample.

3.1.1 Data source

The dataset used for the secondary data analysis in this study draws from T4 Education, a global organisation committed to providing interactive tools, programmes, and events aimed at enhancing educational quality. In collaboration with EdTech Hub, T4 Education conducted the largest global teacher survey post-Covid-19 during the spring of 2021 (↑Pota et al., 2021). This rich, anonymised dataset, which is freely available from T4 Education upon request, offers extensive insights into teachers' use of technology during the pandemic, the digital infrastructure of the schools where they teach, and their participation in professional development opportunities related to remote learning over the preceding year (May 2020 to April 2021). Although the survey primarily focused on these aspects, it also included a series of gender-related questions concerning students' use of EdTech. The inclusion of a gender component in the dataset made it particularly suitable for this study. The Appendix provides the whole questionnaire, with the specific items analysed for this study highlighted in bold. While the survey represented more than 20,000 teachers spanning 165 countries, it included a substantial sample from Pakistan, which was utilised in the analysis for this study.

3.1.2 Sample

The T4 Teachers' survey gathered 2,365 responses from across Pakistan, equivalent to over 10% of the entire global sample. Despite the survey's length, a noteworthy 92% (n = 2176) of these responses were complete. Table 1 below presents descriptive data regarding the teacher sample utilised in the analysis.

Table 1. *Descriptive statistics of the sample population across four metrics*

Metrics	**Participant sample**	
	n	%
Gender		
Female	2012	85
Male	326	13
Prefer not to say	27	1
Years of Teaching Experience		
Less than 2 years	71	3
3 to 5 years	178	8
6 to 10 years	583	24
11 to 20 years	1056	45
21 years to 30 years	310	13
More than 30 years	167	7
Location of School		
Urban	1394	59
Rural	785	33
Town / Suburbs	186	8
Type of School		
Government	2039	86
Private	221	9
Religious schools (Madrassa)	6	0.2
Non-governmental organisation schools	108	5

3.1.3 Data organisation and variables

The T4 Teachers' survey data was cleaned and organised for analysis by aligning the relevant survey questions with the research questions of this study. The four major items considered from the T4 survey, which directly address the research questions of this study, encompass various variables related to gender (these are highlighted in bold in the Appendix and listed below in Table 2).

3.1.4 Data analysis

The descriptive statistical analysis was primarily conducted using the frequency distribution method, creating frequency tables and charts to display the count, ratio, or percentage of occurrences for each response category. This method was applied to each of the four items from the T4 survey that were included in the study. Three out of the four items (a, b, c in Table 2) had three response categories ('Yes', 'No', and 'Do Not Know') and were analysed using frequency tables that listed the count (frequency) and proportion (percentage) of occurrences of each response; results were further visualised using pie charts. The final survey question analysed was: "What should governments do post-Covid-19 to address any loss of learning experienced?" This was a multiple-choice question where participants could select the option they felt most strongly about. Among the several options presented, four are directly related to EdTech and the study's research questions. These options were considered for analysis in this study and are listed in Table 2, below the questions.

Table 2. *Quantitative data analysis guide*

T4 survey question / item	Variables, characteristics, and methods	Visualisation
In your experience over the past 12 months, are any of these true? *a) Girls experienced more learning losses than boys* *b) Parents/caregivers have prioritised boys' learning over girls' during lockdown* *c) Boys have experienced more learning loss than girls*	■ Close-ended question ■ Three variables ■ Frequency distribution analysis ■ Count and percentage of occurrences	■ Pie chart

What should governments do post-Covid-19 to address any loss of learning experienced?

— Provide digital access and devices for marginalised learners (e.g., learners from low-income households, SEND learners, girls, minority language learners)

— Provide more technology for individual learning to those who need more support

— Provide more materials for digital teaching and learning to schools

— Provide training and support for teachers to better integrate technology into education

- Close-ended question
- Four variables
- Variables most closely related to the study chosen
- Frequency Distribution analysis
- Count of occurrences
- Pie chart

3.2 The qualitative phase: Semi-structured stakeholder interviews

3.2.1 Recruitment and sample

For this study, public school teachers and EdTech stakeholders working with the MoFEPT in Pakistan were recruited to participate in one-to-one, semi-structured interviews. Government school teachers were identified through personal networks, WhatsApp, email, word of mouth, and purposive sampling. At the same time, LinkedIn was used to connect directly with EdTech stakeholders involved in government-led EdTech initiatives. Interested individuals received a briefing sheet detailing the research aims, benefits, and data confidentiality protocols. After reviewing this information, participants provided written consent by signing and returning a consent form outlining data protection policies. Once consent was obtained, participants scheduled their interview time slots, and a Zoom link for a 60- to 90-minute interview was sent to them.

The inclusion criteria for teachers required them to be actively teaching Grades 7 to 10 in a public school with at least 2 years of experience. EdTech stakeholders needed to be working on implementing EdTech or digital education policies in public schools. Two-thirds of the participant group consisted of public school teachers (n = 4) in Islamabad, Pakistan, and one-third were EdTech stakeholders (n = 2) working with the MoFEPT (government) in any capacity to implement education technology initiatives specifically in public schools. This was an intentional sample imbalance due to the study's focus on teachers' perspectives, which are

central to three of the four research questions. Table 3 presents the demographic details of the participants.

Table 3. *Details of semi-structured interview participants*

Participant	Role at organisation / school	Years of experience	Gender	Grade(s) taught	Students' gender
Teachers					
IP1	Government school teacher	2	Female	9th and 10th	Female
IP2	Government school teacher	3	Female	6th, 7th, and 8th	Female
IP3	Government school teacher	2	Female	9th and 10th	Female
IP4	Government school teacher	2	Male	7th and 8th	Male
EdTech stakeholders					
IP5	Project director at the Ministry of Education, focusing on EdTech initiatives	13	Male	—	—
IP6	Founder and partner of a firm partnering with the government to implement projects at the intersection of education and technology in Pakistan	15	Male	—	—

3.2.2 Data collection

Several measures were implemented to ensure participant comfort during the remotely conducted research via telephone. These included carefully timing the questions and using introductory phone calls and WhatsApp voice notes to build rapport. Interactional strategies, such as regularly checking in with participants and using informal language, and maintaining a friendly tone, were used to reduce the sense of distance in

the absence of face-to-face contact. Online interviews were conducted and recorded on Zoom, with Otter AI's transcription feature used to create initial notes. These transcripts were then meticulously reviewed and adjusted for accuracy to ensure a verbatim transcription of the recorded interviews.

3.2.3 Data analysis

The interview data was analysed using thematic content analysis to categorise data and highlight key patterns in experiences. NVivo 14 software was employed to conduct the analysis using an inductive approach, ensuring themes were closely linked to the data. Transcripts were imported into the software, where codes were assigned to identify common themes; these themes were then mapped to find overlaps. An iterative process was used to refine and validate the themes, allowing for a nuanced understanding of the data. NVivo facilitated this flexible process, enabling easy rearrangement of themes and ensuring accurate organisation of insights. A thematic map is presented in Figure 6 in Section 4.2.

3.2.4 Sample limitations

The interview sample for this study was limited to Islamabad, Pakistan. This limitation is partially mitigated by including data from the T4 survey, which captures insights from a broader national context beyond Islamabad. Additionally, the Islamabad Capital Territory comprises both urban and rural areas, offering a diverse educational landscape with government schools. MoFEPT frequently pilots EdTech initiatives intended for nationwide scalability in Islamabad, such as Teleschool and e-Taleem. Moreover, greater awareness of educational interventions in this region may enable EdTech stakeholders and teachers to provide more informed and comparative insights into EdTech usage. The interviews were conducted online using Zoom, and each session lasted 60 to 90 minutes. This method introduced a likely sample bias, as participation required fluency in the English language, stable internet connectivity, and access to a personal or shared device capable of supporting video conferencing. Consequently, this excluded individuals without such language skills and internet access. While this has a risk of skewing the findings, as it does not fully represent the diverse educational and technological landscapes across different regions in Pakistan, the researcher interviewed only those directly working with public schools and engaged with the public sector, ensuring transparency. While the T4 survey sample was large (n = 2365), the interview sample (n = 6) was small, meaning that frequencies in some thematic categories were low (sometimes including only one interviewee)

and the generalisability of those findings and related recommendations, particularly from only two EdTech stakeholders, is inevitably very limited.

4. Findings

Both quantitative and qualitative data equally inform the results.

4.1 Quantitative survey findings

4.1.1 Teachers perceive no significant difference in learning losses among boys and girls

Figure 2. *Perceived gender differences in learning losses during the Covid-19 lockdown (focus on girls)*

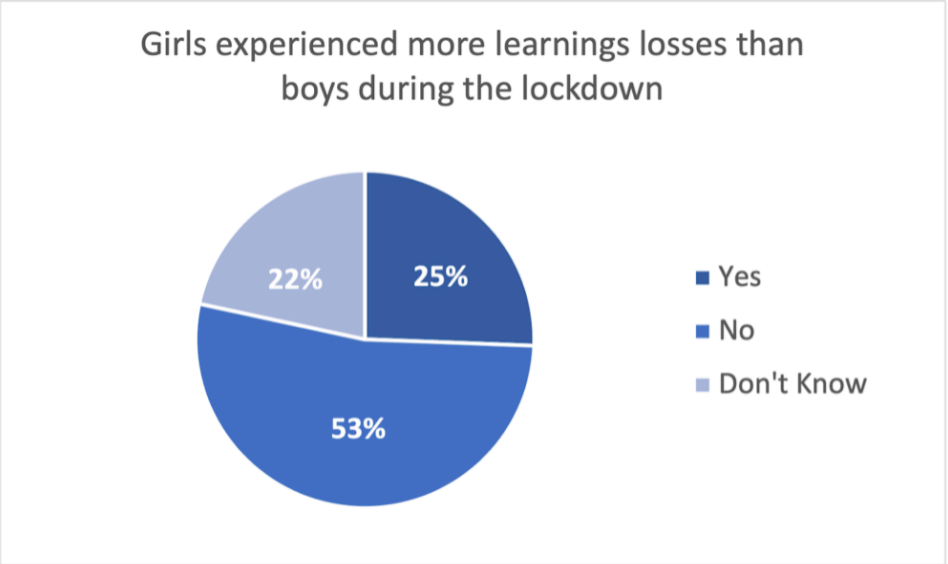


Figure 3. *Perceived gender differences in learning losses during the Covid-19 lockdown (focus on boys)*

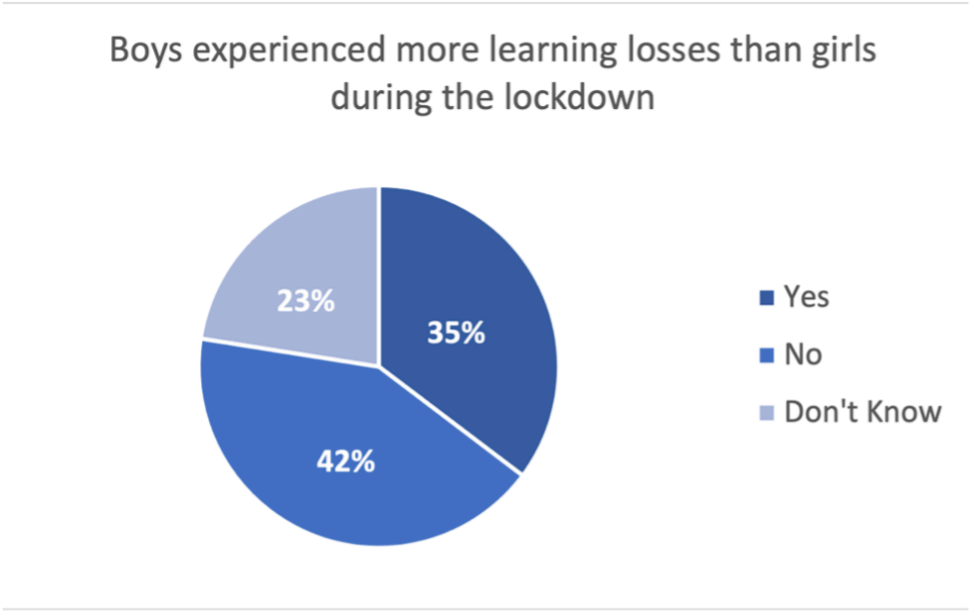


Figure 2 and Figure 3 above visually depict the results of two questions from the T4 Teachers' survey, which had 2,184 and 2,182 responses, respectively. During the lockdown, schools across Pakistan were closed and students relied on technology for education and learning. Teachers were asked if they perceived different degrees of learning losses based on gender. Interestingly enough, slightly less teachers (35%) perceived boys to have suffered more learning losses than girls during the pandemic compared to 42% who did not believe that boys suffered more learning losses compared to girls during the COVID-19 lockdown.

4.1.2 Teachers believe that parents do not prioritise their children's education based on gender

Figure 4 below shows the results of this survey question, which had 2,183 responses. While the question may not appear to be directly about the use of technology for education at home by students, the fact that during the lockdown, schools across Pakistan were closed, and students relied on technology for education and learning in their homes has been established. Over half of the teachers (52%) did not believe parents or caregivers prioritised boys' education over girls' during the lockdown. Additionally, more teachers said they didn't know if that was the case or not than those who thought that parents / caregivers did indeed prioritise boys' education over girls' during the lockdown.

Figure 4. *Parental prioritisation of children's learning during lockdown*

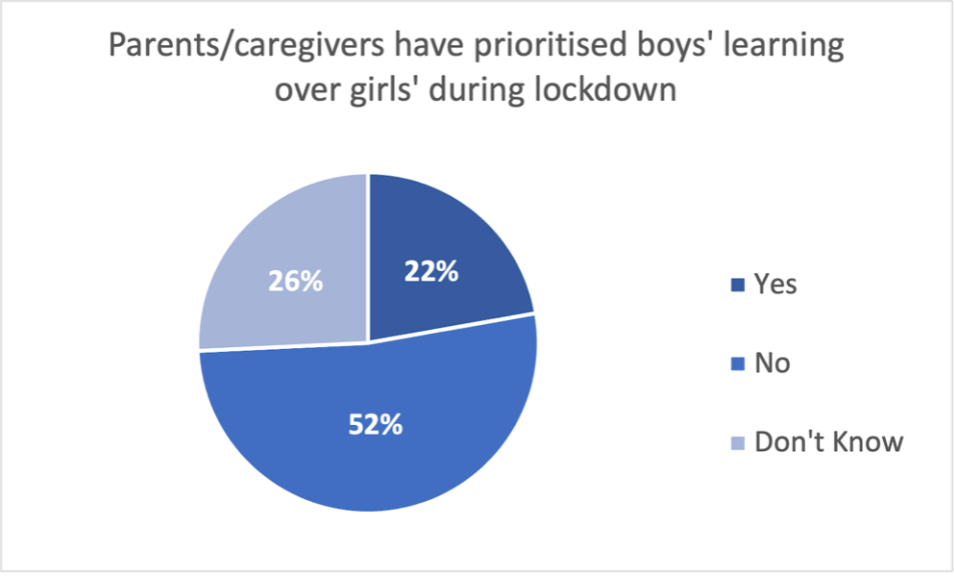
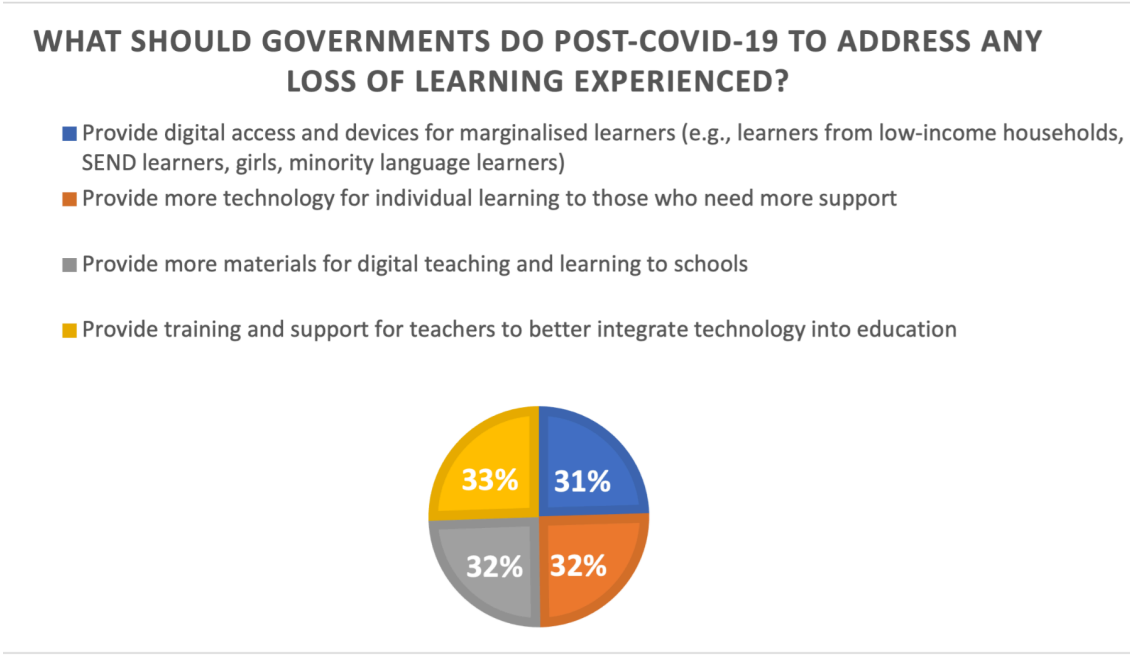


Figure 5 below presents the result of the survey question asking teachers what they thought the government should do to address learning losses experienced by learners during the Covid-19 pandemic. The four response

options directly related to EdTech and this study's research questions were considered.

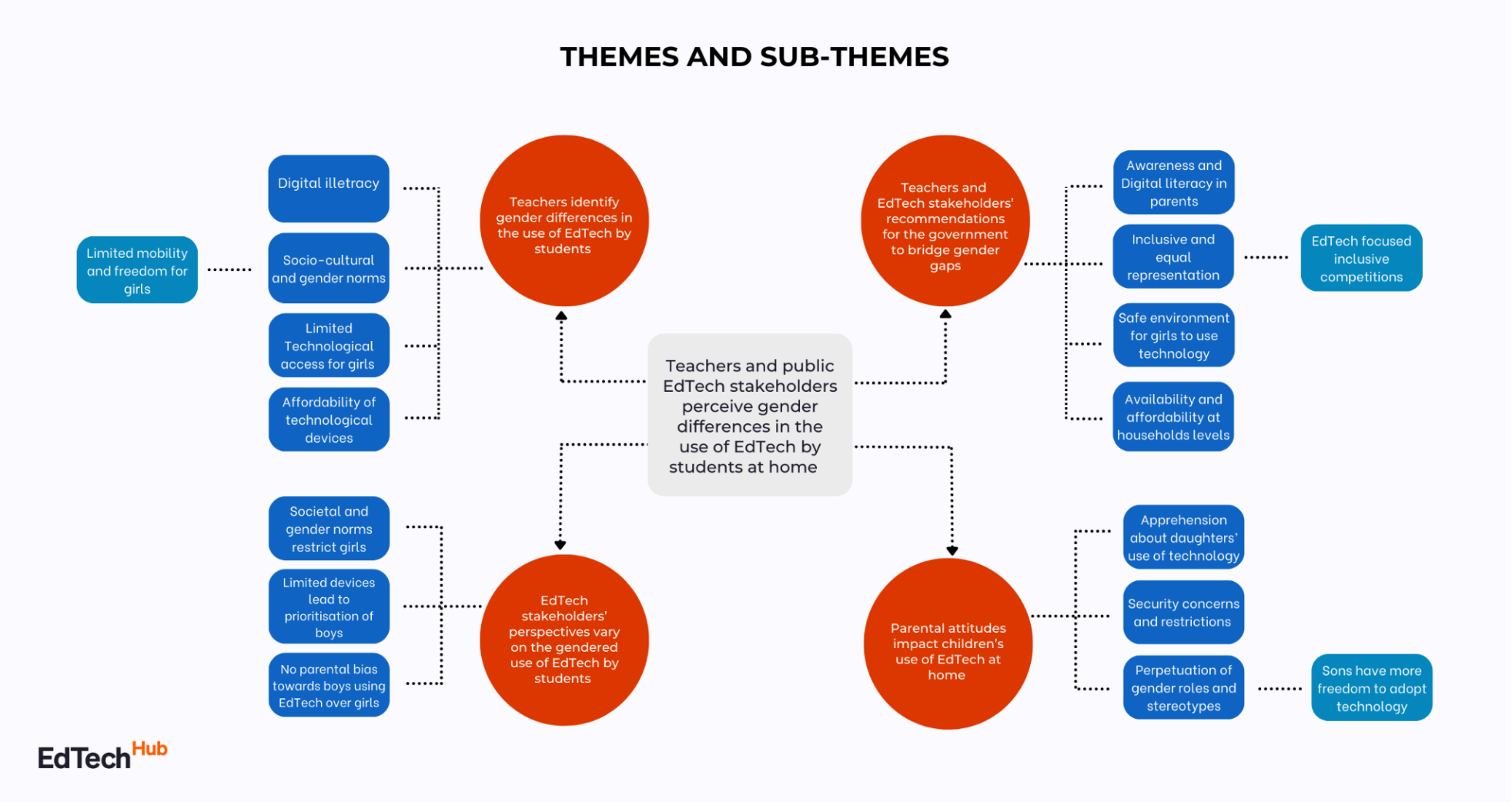
Figure 5. *Recommendations for the government to address the learning losses incurred during the pandemic*



Most teachers thought that the government should provide training and support for teachers to integrate technology into education, with 787 (33%) teachers indicating this as a priority. This suggests a strong consensus among teachers that teacher training is crucial for effectively integrating technology into education post-pandemic. Slightly fewer teachers responded that the government should provide more technology for individual learning for those who need more support. This indicates that many believe increased technology access for individuals who most need it is something the government should do to mitigate the learning losses post-Covid-19 pandemic. The lowest number of teachers (757 or 31%) suggested that the government should provide digital access and devices for the most marginalised learners. However, it is important to note that the range of responses (757–787) was relatively narrow, indicating no significant differences here.

4.2 Qualitative findings from interviews

Figure 6. *Themes and sub-themes mapped from thematic analysis of qualitative data*



4.2.1 Girls have limited access to technological devices at home

During the one-to-one online interviews with teachers, several of them emphasised that the girls they teach have limited access to technological devices at home. One teacher (IP2) mentioned that even if their students have access to technology at home, being allowed to use it for educational purposes or having access to the internet is often considered a privilege (Table 4 below, Excerpt 1). Another teacher (IP4), who teaches at an all-boys school, spoke about a proposed collaboration with a female teacher from an all-girls school; the plan was to create an online group to facilitate activities among boys and girls of the same grades. However, the collaboration failed because the female teacher raised several issues related to her students' lack of access to technological devices and resources. The male teacher expressed surprise at the significant disparity in technological access and adoption between boys and girls of the same age and socio-economic class (Table 4 below, Excerpt 3). Another teacher (IP1) spoke at length about the complicated dynamics that exist at home in which her students navigate to get access to phones; students have to rely on distant relatives to get access to phones and use them for educational purposes as they have no direct access to technological devices (Table 4, below, Excerpt 4). Echoing similar home dynamics, another teacher (IP3) highlighted the lack of availability of cell phones for her students. She explained that her students often have to wait for their fathers, brothers, or other relatives with cell phones to return home from work before they can access them (Table 4 below, Excerpt 2).

Table 4. *Direct quotations from online interviews concerning limited technological access for girls*

Core theme	Sub-themes	Excerpt	Participant	Quote
Girls have limited access to technological devices at home	Lack of internet connectivity	1	IP2	Yes, my students use technology, but there are very few students who have the privilege to use the internet or other phones or even computers.
		2	IP3	They don't have availability of cellphones all the time, they have to wait for their fathers or the person who has the cell phone to come back to their home.
		3	IP4	I was trying to collaborate with one of the female teachers teaching in an all-girls public school. When I discussed my plan with her, she told me that this is not workable in the community she is teaching because they do not have access to technology.
		4	IP1	We can say that about 60% of them do not have access to phones. They might have no direct access, but sometimes it could be like, some distant relative has a phone or something like that. A third person needs to be present in between for them to be able to access that. So there's a lot of gap in between, and this is one of the manifestations of not having a cell phone or any technology at all.

4.2.2 Affordability of technological devices

Teachers discussed the financial challenges families face in affording devices and internet resources. Teachers (IP4, IP2) mentioned that many parents are daily labourers from lower socio-economic backgrounds, making it difficult to afford technological devices. Additionally, other

teachers (IP4, IP1) noted the prevalence of outdated devices that cannot support modern software, thereby limiting students' access to educational resources at home (Table 5, Excerpts 1, 2, 3, and 4).

Table 5. *Direct quotations from online interview participants concerning the affordability of technological devices*

Core theme	Sub-themes	Excerpt	Participants	Quote
Affordability of technological devices	Lack of devices and technological resources	1	IP4	I would say that the economic and social structure of these communities are such that parents are daily labourers, and because in the first place, those kids and their parents do not have a smartphone.
		2	IP2	There are no laptops here, so basically they have phones and a very less percentage have smartphones.
	Outdated devices unable to power the latest technology	3	IP4	And because they have really simple phones, they can only call each other or maybe send very simple text messages, and they do not have WhatsApp. So they cannot access those learning materials or be a part of the WhatsApp groups.
		4	IP1	The second would be that they do not have phones that can power the latest technology. For example, they might have smaller phones, like not smartphones, so they have small powered cell phones with them. They're not smartphones, but they do have cell phones

4.2.3 Digital literacy

Digital literacy emerged as one of the themes during the interviews when a teacher (IP2) spoke about the biggest challenge to EdTech adoption by girls, in her view, being the lack of skills to operate technological devices and knowledge of new technological applications and websites for educational resources (Table 6, Excerpt 1). This likely relates to the limited technology access for girls outlined in the two previous subsections.

Table 6. *Direct quotations from online interview participants concerning digital literacy*

Core theme	Excerpt	Participants	Quote
Digital literacy	1	IP2	They don't know how to operate their phones correctly. They don't know how to search for things on Google. I think that the biggest challenge for students is knowing how to operate technology and to know about the new technology.

4.2.4 Scepticism and security concerns

Teachers discussed parental attitudes towards technological use based on gender. Teachers IP3 and IP1 noted that parents often impose restrictions on their children's use of technology, regardless of gender. These restrictions are primarily due to concerns about age-appropriate use, security issues, and fears that excessive exposure to technology might be overly stimulating for young children. Contrastingly, some teachers (IP4 and IP1) emphasised that male parents are often more apprehensive about their daughters' use of technology compared to their sons, and are stricter and more restrictive towards their daughters than their sons (Table 7 below, Excerpts 1, 2, 3, and 4).

Table 7. *Direct quotations from online interview participants concerning parental scepticism and security concerns related to their children's use of technological devices and the internet*

Core theme	Sub-themes	Excerpt	Participants	Quote
Scepticism and security concerns	Parental concerns and restrictions	1	IP3	One of my students wanted to know how she can work online at Amazon, but her parents stopped her as they thought that the time is not right, so I don't think that it's due to gender but due to sensitivity of time and age.
		2	IP1	Parents or guardians are sceptical of the students using them wrongly, or too much so, I've had a lot of talks with the parents of these students. Mostly, they have one thing to say that these children, they sometimes get carried away.
	Male parent apprehensive of their daughters' use of technology	3	IP4	As far as I know, males, or fathers, are okay to give cell phones to the boys, but not okay to give access to daughters. I was not able to coordinate with the female teacher because the parents did not want the daughters to access a platform that comprised a diversity of participants.
		4	IP1	For example, if there's a father who's very scared that technology might mislead their daughters or their sons, they're more likely to exhibit that in their actions, and I think that the daughters are very much receptive to that kind of behaviour from the parents.

4.2.5 Perpetuation of gender roles and norms

Three out of six teachers (IP4, IP2, IP1) spoke at length about the gender roles and norms perpetuated by elders and parents in households regarding girls' use of technology for learning purposes. Teachers noted that boys have much more freedom than girls from the same households to adopt technology at home and are given access to devices and resources at a young age, leading to better exposure and learning opportunities in some cases. One teacher (IP2) added that traditional norms and gender stereotypes reinforced by elders are harmful because they lead girls to believe that their exposure to and use of technology is not important for their future, as they are expected to marry and take care of children (Table 8, Excerpts 1, 2, 3, 4, 5, and 6).

Table 8. *Direct quotations from online interview participants concerning parental perpetuation of gender norms*

Core theme	Sub-themes	Excerpt	Participants	Quote
Perpetuation of gender roles and norms	Sons have more freedom to adopt technology than daughters	1	IP4	So in this community, boys have more freedom in terms of the use of technology. And this comes from the endorsement of both parents. Boys have WhatsApp accounts most of the time. So these are really common things, like among boys, but I don't think it is that much common among females, because of this stereotype of not using technology, right? Or maybe it hurts their traditions or norms in that perspective, and this also hinders the learning opportunities that come through technology.

Core theme	Sub-themes	Excerpt	Participants	Quote
		2	IP2	Parents' attitudes towards boys are very different from girls; they grant access to technology for boys at a very young age; but girls are not allowed, they don't have that access. Boys have it better; they have access to technology at home, they have access to technology in school, they know and everything, they know what is happening around the world.
		3	IP1	I have talked to a lot of these students, and they've told me about their brothers having a lot of freedom in things that they might not have freedom in.
	Perpetuation of gender roles and stereotypes	4	IP2	Elders tell girls why are using phones at home, why are spending time on this, you have just the right to basic education, and then you have to do the house chores because ultimately, you have to build a family and these things serve no purpose for mothers, they can't see any purpose of using phones for girls. So the attitude is very different for boys and girls.
Sociocultural and gender norms influence girls' access to and adoption of technology at home	Early marriages	5	IP4	And secondly, in the case of dropout and not continuing education, there is this traditional norm as well, where females undergo early marriages.

Core theme	Sub-themes	Excerpt	Participants	Quote
	Patriarchal households and gender stereotypes	6	IP1	I can tell from the girls' perspective that they are not allowed by the male members of the family, a lot of the time, to have larger flexible access to cell phones. Males are a protective figure in the family, right? So they're a figure that the females often rely on. So they have a lot of, you could say, responsibility towards the actions of their siblings, their daughters. These communities may not have security access, so there's this sort of hypervigilance that is present in the character of men in these societies.

4.2.6 No parental bias towards boys using EdTech over girls at home

Contrary to what other EdTech stakeholders and most teachers expressed, one of the EdTech stakeholders (IP5) did not believe that a parental bias existed towards boys using EdTech over girls at home. Instead, IP5 emphasised that parents generally preferred in-person and physical modes of learning, and that once the barrier of school enrolment was crossed for girls, there seemed to be no bias in restricting their access to technology for learning purposes (Table 9 below, Excerpts 1 and 2).

Table 9. *Direct quotations from online interview participants concerning the lack of parental bias towards EdTech use*

Core theme	Sub-themes	Excerpt	Participants	Quote
No parental bias towards boys using EdTech over girls at home	Parental preference for in-person modes of learning over digital	1	IP5	There is a very strong preference by parents for physical movement and [...] so in their priority list, technology does not rank very high.
		2	IP5	Some of the data that we've collected and analysed as part of our research does not point towards parents having a particular bias towards girls when it comes to using technology for education and so if the education barrier is crossed, which means they are enrolled in schools, there isn't much of a difference in whether they would have significantly different access to opportunity just based on parents' perception of whether technology can help or not.

4.2.7 Increasing awareness and digital literacy among parents

Teachers IP2 and IP4 believe that increasing digital literacy and awareness among parents is essential for changing mindsets and attitudes toward using technology for learning for both girls and boys. They emphasised that the government should focus on policies and initiatives that promote digital literacy among parents, helping them understand the utility of technology for educational purposes for both genders. Additionally, one of the teachers (IP4) expressed the need for more robust policies specifically aimed at increasing parental awareness (Table 10 below, Excerpts 1, 2, and 3).

Table 10. *Direct quotations from online interview participants relating to parental awareness and digital literacy*

Core theme	Sub-themes	Excerpt	Participants	Quote
Increasing awareness and digital literacy among parents	Changing parental mindsets and attitudes	1	IP2	But I think right now we have to change the thought process of parents and this will be the first step in eliminating gender differences, which is the biggest problem in Pakistan right now.
		2	IP2	The government is trying to bridge this gap by launching different educational applications to enhance digital literacy and now parents are forced to give access to technology to girls, even if they don't want to.
		3	IP4	So there must be some policies that, in the first place, should spread awareness to the parents so that they could be giving access to technology to female or male children alike.

4.2.8 EdTech-focused inclusive competitions among boys and girls

One teacher (IP4) suggested that the government should arrange a common platform for boys and girls to participate in competitions and share ideas and experiences centred around EdTech. He expressed that this initiative could help parents witness the benefits of sharing EdTech practices, motivating and encouraging them to allow their children to engage more with technology. Additionally, it would help students develop more confidence in adopting EdTech:

> *"There should be some competitions where EdTech must be promoted, where girls and boys all come on one platform, and they interact with each other. Share ideas and experiences of using EdTech for learning, and parents should also be involved."*
> (Teacher IP4, Online interview)

4.2.9 Inclusive and equal representation

One of the teachers (IP1) spoke about the underrepresentation of women in media and believed that if women were represented more in the digital space engaging with EdTech as much as men are, this could be a good start for bridging the gender gaps in EdTech adoption:

> *"Representation in media. Women are still underrepresented in this digital age, so I feel that more representation is required."*
> (Teacher IP1, Online interview)

4.2.10 Creating a safe environment for girls to use technology

Strengthening cybersecurity and creating a safe environment for girls to use technology emerged as a key theme highlighted by one teacher (IP1). They suggested that the government should bridge the gender gaps in EdTech utilisation by spreading awareness through public service messages and social media and creating a stronger cybersecurity infrastructure; this approach would enable girls to engage with EdTech more confidently and securely.

> *"It's important for the government to make a safer environment around the usage of technology. For example, we've had this public service message coming through calls that the use of social media is sometimes dangerous, and it needs to be, you know, controlled in a way that if you see someone taking pictures or doing unlawful activities, you should report them."*
> (Teacher IP1, Online interview)

4.2.11 Availability and affordability of internet and devices at household level

An EdTech Stakeholder (IP5) suggested that ensuring widespread availability and affordability of internet and technological devices at the household level is a key step the government should take to bridge the gender gaps in technological adoption at the household level. Large-scale affordability and availability of devices and resources would mean increased adoption of and access to EdTech by all genders.

> *"Affordability of the internet, affordability of devices and widespread availability of devices and households are going to be key."*
> (EdTech Stakeholder IP5, Online interview)

5. Discussion

This study examined perceived gender differences in the use of educational technology by secondary school students at the household level. Views from teachers and public EdTech stakeholders were incorporated through qualitative one-to-one interviews and supplemented with quantitative data from the T4 Teachers' survey. EdTech stakeholders identify several sociocultural gender issues that female students face at home regarding EdTech adoption and access. Additionally, they highlight challenges they believe students encounter regardless of gender, such as affordability and parental scepticism, which can restrict the use of technology at home. Interestingly, however, the quantitative results of the study found that teachers perceived no significant parental bias based on gender concerning EdTech adoption at home, though this is a relatively underexplored area in the existing literature. The following section delves deeper into these findings, connects them with existing evidence and literature, and identifies areas for further research, along with the broader implications for policy and practice.

5.1 Gender differences in EdTech adoption at home

The findings of this study reveal that EdTech stakeholders perceive girls to have limited access to technological tools and internet resources compared to boys in the same households. This is also true for comparisons across socio-economic brackets and age groups. This observation is consistent with the literature reviewed in Pakistan's research landscape (see Section 2.3), particularly ↑Jumani et al.'s (2022) study, which emphasises online education as a potential solution to bridging the gender digital divide in Pakistan. ↑Jumani et al. (2022) identified key barriers to this divide, including access, affordability, sociocultural norms, and digital literacy. Affordability emerged as a significant barrier, with many families relying on outdated devices incompatible with newer technologies and applications. This finding is supported by other research indicating that the high cost of mobile and internet services in Pakistan is a significant obstacle to widespread adoption (↑Aslam et al., 2011; ↑Hanif et al., 2018; (↑Mazhar et al., 2014), reinforcing the challenges highlighted in this study.

The most significant factor identified by several participants interviewed in this study was the influence of gender and sociocultural norms in Pakistan, which are believed to pose a barrier to girls' access to and adoption of technology for learning. Sections 4.2.1 and 4.2.5 highlighted that patriarchal

households, gender stereotypes, limited mobility and freedom for girls, early marriages, and the perpetuation of restrictive gender norms are considered to contribute to girls having limited access to EdTech. Previous research in Pakistan supports these findings (↑Majid & Mustafa, 2022; ↑Siegmann, 2009), particularly ↑Shanahan's (2021) study, which emphasises the restrictive cultural attitudes that limit women's and girls' access to technology. Additionally, ↑Singh's (2017) study in low- and middle-income countries found that women are, on average, 16 percent less likely than men to use the internet, further evidencing the gender digital divide reflected in this study's findings.

However, the interview sample was very small and included no direct data from parents themselves. In contrast, nearly all quantitative findings of the study indicated that teachers perceived no significant gender differences in the use of technology at home for educational purposes (Section 4.1.1). The T4 Teachers' survey results, drawn from a much broader sample, revealed that teachers did not believe girls suffered more learning losses than boys during the Covid-19 lockdown when online learning was the primary mode of education. Additionally, one of the interview findings was that gender and sociocultural norms are not thought to impact EdTech adoption significantly once students are enrolled in school; these norms predominantly act as barriers for out-of-school girls, where their effects are most pronounced. Recent research evidence from Pakistan, as demonstrated in a study by ↑Ullah et al. (2023), aligns with the findings of this study, showing that among secondary students in rural and urban schools, girls outperform boys in urban areas, and gender was not a determining factor in learning outcomes.

Additionally, evidence suggests that girls have a lower dropout rate than boys in urban areas (↑Akhtar, 1996). However, this could be attributed to the tendency for boys to be sent to private schools, which are generally of better quality, leading to differential treatment against girls that hinders their adoption and utilisation of educational opportunities, and subsequently their mobility in further domains (↑Aslam, 2009; ↑Lloyd et al., 2005). A reason for this finding being contrary to most of the other findings of this study can be explained by the methodology: this particular result is mainly derived from quantitative research, as highlighted in Section 3.2.4, where the variables were straightforward and did not delve deeply into the gender nuances, unlike the qualitative research.

Literature examining the impact of computer anxiety on students in Pakistan (Section 2.3) indicates that female learners experience significantly higher levels of computer anxiety compared to male learners and are generally less prepared and tech-savvy (↑Kanwal et al., 2020). This

finding aligns with one of the key insights from interviews in the current study, which identified a lack of digital literacy among students, particularly girls, as a significant barrier to their access to and adoption of technological tools and resources. This evidence underscores a critical need for policy action aimed at enhancing digital literacy among young people, thereby improving their educational opportunities and prospects.

5.2 Parental attitudes perpetuate sociocultural and gender norms

A prominent finding that emerged from the interviews with teachers and EdTech stakeholders is that parental attitudes toward girls' use of EdTech at home are considered to be heavily influenced by existing sociocultural and gender norms. Girls reportedly face barriers to using technology at home due to these restrictive attitudes, as elders often disapprove of girls using technology, expecting them to take on household responsibilities instead. Such expectations perpetuate gender stereotypes and discourage girls from using technology for learning purposes. Consequently, interview participants believed that boys enjoy more freedom and opportunities than girls from similar households, albeit facing challenges of other kinds. Existing evidence supports this finding, as research has shown that societal norms and parental interventions often influence girls' use of technology (↑Steinberg et al., 2024). The leading factor contributing to the gender digital gap in Pakistan is familial disapproval of women's and girls' access to and use of technology (↑Shanahan, 2021) as evidenced by the literature reviewed in this study (see Section 2.2). These findings underscore the need for policies and interventions that address these structural and psychological barriers, promoting gender equality in technology access and use.

The qualitative interviews revealed that teachers believe parents are generally sceptical about their children's use of technology, even for educational purposes. This scepticism and strictness are more pronounced among male rather than female parents, with more severe restrictions imposed on girls than boys within the same household. Parental concerns include the age group of children using technology, the content they are accessing, and the risk of overexposure. Research in Pakistan has highlighted similar concerns, showing parents' reluctance to give smartphones to their children. ↑Tahir & Arif (2015) found that although parents recognise the educational benefits of mobile technology, they have significant concerns about its potential misuse. Parents often act as gatekeepers, regulating their children's access to and use of digital technologies (↑Dias et al., 2016). However, further research is needed to

explore how technology can be effectively integrated into educational settings to address these parental concerns (↑Jabbar et al., 2019)

Another key finding of the current study derived from three interviews with teachers is that teachers believe parents prioritise males over females when providing access to technology for learning at home. The challenges the teachers identified (see Sections 4.2.1 and 4.2.4) pertain to male household members' access to technology being prioritised when there is a lack of devices, leaving female children and women in the household disadvantaged. This mirrors ↑McGrath & Sinclair's (2013) research, which identified a cultural preference for male education over female education. This preference may also stem from security concerns, as parents tend to be more sceptical and impose stricter restrictions on girls' technology use than boys.

In contrast to these findings, and the previous research that indicates parents give more freedom to boys than girls in using technology for learning opportunities (↑Barnes et al., 2024; ↑Unwin et al., 2017), quantitative findings from the large-scale survey analysed for the current study (see Section 4.1.2) instead indicated that teachers believe that parents do not prioritise boys' learning and access to technology over girls'. The discrepancies in the findings are not only explained by the methodological differences in deriving them, but also indicate a need for further and more targeted research in Pakistan to explore in more depth whether parents prefer male children over female children using EdTech.

5.3 Implications for policy and practice

Teachers and public EdTech stakeholders' practical recommendations for how the government of Pakistan can bridge the gender divide in students' use of EdTech at home were outlined in Sections 4.2.7 to 4.2.11. Given that education is a devolved subject under Pakistan's 18th Constitutional Amendment, it is essential to recognise that policy implementation and educational interventions vary across provinces. Therefore, while these recommendations offer valuable insights, their applicability may differ regionally, requiring tailored approaches by each provincial government.

Teachers, being at the forefront of pedagogy, and public EdTech stakeholders, who initiate and oversee EdTech programmes in schools, provide credible, first-hand insights. Their recommendations include increasing digital literacy among parents, organising inclusive EdTech competitions for girls and boys in public schools, ensuring equal gender representation in media, creating a safe digital environment for girls, and

enhancing the affordability and accessibility of technology at the household level.

These suggestions align with the study's findings on barriers to girls' use of EdTech and parental attitudes toward technology. For example, the recommendation to improve digital literacy directly addresses students' lack of digital skills, particularly for girls, which hinders EdTech engagement. Media literacy initiatives could also be province-specific, to account for cultural and socio-economic differences and to address parental concerns more effectively (↑Naseer et al., 2022). ↑Ghiara (2020) emphasises the need for parents to improve their own digital literacy, which could be encouraged differently in each province through regionally tailored campaigns.

National initiatives like the 'Digital Pakistan' campaign aim to drive digital inclusion, but provincial governments are responsible for implementing educational programmes. For instance, while the federal government launched the TeleSchool initiative, its reach and integration into provincial education systems vary. Similarly, the DigiSkills[1] and eRozgar[2] programmes primarily target youth nationwide, but may require provincial-level adaptations to address specific regional barriers to EdTech access.

Additionally, the recommendation to hold inclusive EdTech competitions must consider regional disparities. Provinces with more developed infrastructure, like Punjab and Sindh, may easily organise such events, whereas provinces like Balochistan and Gilgit-Baltistan may need additional resources. Private sector and non-governmental organisation (NGO)-led initiatives, such as Teach for Pakistan's STEM olympiad,[3] offer a model that can be scaled with provincial collaboration. Involving parents in these events could help mitigate gender-based apprehensions, but strategies for engagement would need to reflect cultural norms across different provinces.

Equal gender representation in media was another suggestion, yet media consumption and gender norms differ across provinces. While national campaigns like 'Pakistan's Media Needs Women' advocate for gender equality in media, provincial media landscapes vary, requiring localised strategies to promote positive gender representation (↑Asghar & Akhter, 2022;↑Yasmin et al., 2019).

[1] See https://digiskills.pk/. Retrieved 23 July 2025
[2] See https://erozgaar.pitb.gov.pk/. Retrieved 23 July 2025
[3] https://iteachforpakistan.org/wp-content/uploads/2022/09/STEM-Olympiad_compressed.pdf. Retrieved 23 July 2025

Strengthening cyber laws to protect girls online is crucial, but provincial implementation is key. Although the federal government has introduced measures like the ↑The Criminal Law (Amendments) Act 2023 (Government of Pakistan)to combat online threats to children, provincial authorities must enforce and adapt these laws to local contexts. Tailored provincial policies can create safer digital environments, addressing specific regional risks and challenges related to girls' technology use.

Finally, ensuring widespread affordability and access to technology must also be viewed through a provincial lens. While national programmes like the Prime Minister's Laptop Scheme[4] and Jazz Smart School Initiative[5] aim to increase device access, provincial disparities in smartphone ownership and internet access persist. For example, while Punjab may benefit more from the 'GSMA smartphone for all' initiative (↑Jeffrie, 2023) due to its higher infrastructure development, provinces like Khyber Pakhtunkhwa and Balochistan may require additional interventions. National data shows that 74% of women in Pakistan do not own smartphones, but this figure likely varies significantly between provinces (↑Gallup Pakistan, 2025)

In summary, while these policy recommendations are promising, their success depends on the active involvement of provincial governments. Tailoring initiatives to provincial contexts is essential to effectively bridge the gender gap in EdTech use across Pakistan.

[4] See https://www.hec.gov.pk/english/services/students/pmnls/Pages/default.aspx. Retrieved 13 April 2025.

[5] See https://jazz.com.pk/media-center/detail/jazz-smart-school-program-launched-to-impart-quality-education. Retrieved 13 April 2025.

6. Policy recommendations

To effectively address gender disparities in EdTech adoption in Pakistan, the following policy recommendations are designed to be actionable, scalable, and responsive to the provincial context. These recommendations offer immediate and long-term solutions based on stakeholder insights and successful models.

6.1 Increase affordability and widespread access to EdTech across regions

Action: The government should collaborate with Internet Service Providers (ISPs) and telecom companies to offer subsidised data packages for educational platforms. For example, as suggested in Tabadlab's TeleSchool report, special deals or discounts for data plans can be introduced for EdTech apps to lower the cost barrier (↕Sheikh & Nadeem, 2023).

Feasibility: High. The federal and provincial governments can incentivise ISPs through tax reductions or public-private partnerships.

Quick return potential: High. Subsidised data plans can immediately increase access for low-income households.

Good practice: Jazz's Smart School Program has effectively partnered with public schools to provide free internet access to digital learning content.

6.2 Increase awareness and digital literacy among parents

Action: Launch province-specific digital literacy campaigns targeting parents, especially mothers, through community centres, schools, and mass media. This can include short training sessions on using EdTech tools and understanding online safety.

Feasibility: Medium. Requires coordination with local governments, schools, and community organisations.

Quick return potential: Moderate. Digital literacy improvements will gradually translate into greater EdTech engagement.

Good practice: The Punjab IT Board's eLearn platform has successfully raised awareness about digital learning by integrating local languages into its outreach programmes.

6.3 Hold inclusive EdTech competitions to encourage girls' participation

Action: Organise national and provincial EdTech competitions that actively encourage girls to participate in coding, robotics, and app development. Schools can partner with tech companies to provide resources for participation.

Feasibility: High. Requires logistical support and partnerships with private EdTech firms.

Quick return potential: Moderate. These competitions can generate immediate interest but require consistent follow-up to sustain engagement.

Good practice: The Khyber Pakhtunkhwa Youth Digital Skills Program organises competitions and workshops that have increased female participation in digital skills training.

6.4 Strengthen cyberspace laws and online safety for girls

Action: Provincial governments should collaborate with the Federal Investigation Agency (FIA) to localise and enforce the Prevention of Electronic Crimes Act (PECA) by offering helplines and quick-response units for online harassment cases involving girls.

Feasibility: Medium. Requires inter-agency coordination and public awareness of legal protections.

Quick return potential: Low. Legislative changes and enforcement take time, but are critical for long-term safety.

Good practice: The Cyber Harassment Helpline by the Digital Rights Foundation has been effective in supporting women and girls facing online abuse (↑Jannat, 2020).

6.5 Increase female representation in media and the digital space

Action: Introduce content quotas in public media to showcase female role models in technology and science. Launch media campaigns featuring successful women in EdTech to challenge stereotypes.

Feasibility: High. State-run channels can implement content quotas, while private media can be incentivised.

Quick return potential: High. Media influence can rapidly shift societal perceptions.

Good practice: The 'SheMeansBusiness'[6] campaign by Facebook has effectively promoted women entrepreneurs worldwide.

These recommendations align with the ongoing work in Pakistan to improve technological access for students and bridge the gender divide that exists across sectors, including education. This study underscores the importance of addressing gender differences in technology use and highlights policy actions that can help bridge the gender gap. It is a call to action for improving EdTech policies to ensure equitable educational opportunities for all learners, regardless of gender.

[6] See https://www.facebook.com/business/small-business/she-means-business. Retrieved 23 July 2025.

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Appendix: T4 Education: Turning to technology survey questions

NOTE: Questions used in this study are highlighted in bold.

About you.

1. During the last 12 months, did you work as a schoolteacher?

What best describes your gender? Select one answer.

2. Select where you teach.

3. Do you have any long-standing illness, disability or infirmity? (Long-standing means anything that has troubled you over a period of time or that is likely to affect you over a period of time)?

Yes | No | Prefer not to say

How many years of school teaching experience do you have?

Less than 2 years | 3 to 5 years | 6 to 10 years | 11 to 20 years | 21 to 30 years | More than 20 years

4. What is the highest qualification for teaching you have received?

About your school.

What type of area is your school located in? Select one answer.

What type of school do you teach at?

Public/State/Government funded/Charter/Academy school | Private school | Low-cost private school | Religious school | Charity or NGO funded school

Select your school's main curriculum

5. Describe the infrastructure usually available in your school

- My school has access to the internet Yes | No
- All or most teachers have access to the internet at home Yes | No

6. Which of the following best describes the digital devices usually available in your school? Select all answers that apply to you

- My school does not have any digital devices

- My school has one computer/laptop/tablet for the school
- My school has one computer/laptop/tablet for each class
- My school has one computer/laptop/tablet or mobile device per teacher
- My school has one computer/laptop/tablet per child
- My school has digital devices available but none of them are working
- Teachers have to bring their own device
- Learners have to bring their own device

About your learners

What age are the learners you are teaching this year? Select all answers that apply to you.

0-4 years old | 5-7 years old | 8-11 years old | 12-16 years old |17 years or older

7. If you are teaching at a secondary school or tertiary college/university, what subject(s) do you teach? Select all answers that apply to you.

- Language studies/foreign languages (These are different from the main language you teach in and include language and literacy in a language that is not your mother tongue)
- Reading, writing, literacy, literature in your mother tongue or first language
- Mathematics
- Economics
- ICT and Computing (e.g. coding, information technology, electronics, graphic design, design technology, construction)
- Science (e.g. life science, biology, chemistry, physics, environmental science, engineering, surveying)
- Personal, Social and Health Education (e.g. health studies, grooming, hygiene, personal health & safety, social relationships, character)
- Business Studies (e.g. accounting, book keeping, human resources, marketing, project management, international business, operations)
- Physical Education (e.g. sport, physical education, gymnastics, dance)
- Domestic Sciences (e.g. cooking, knitting, sewing, home economics)

- Social and Human Sciences (e.g. psychology, law, community or contemporary studies, civic education, citizenship, environmental studies, legal studies, political science, anthropology, sustainability studies)
- Practical, Trade and Vocational Skills (These are skills that help prepare you for a specific job. e.g. mechanics, plumbing, electrical, childcare, hairdressing, tourism, driving, chef, welding, technician, fitting, fashion, hospitality, scaffolding)
- Religion/Ethics (e.g. religion, history of religions, religion culture, ethics)
- Arts (e.g. arts, music, visual arts, drama, photography, drawing, film, media studies)
- Humanities (e.g. geography, history, philosophy, theory of knowledge)
- I only teach in primary school

8. Overall, how would you describe the socio-economic status of the learners at your school? Select all answers that apply to your school.

High socio-economic status | Medium socio-economic status | Low socio-economic status Teaching during the COVID-19 pandemic.

9. What happened to your school during the COVID-19 pandemic?

10. My school remained open throughout the pandemic | My school was open some of the time, but closed during lockdown(s) remained closed throughout the pandemic

11. You said that your school was closed during lockdowns. Were teachers able to undertake remote learning in those times? Select one answer.

Yes | No | Some of the time

12. Did you do any of the following in the COVID-19 pandemic?

- Make printed copies of digital resources to share with learners
- Contact learners through messaging services (e.g. SMS, Whatsapp, other)
- Contact parents/caregivers through messaging services (e.g. SMS, Whatsapp, other)
- Contact parents/caregivers via phone
- Share lessons and tasks with learners by e-mail
- Contact parents/caregivers via email

- Make audio-recordings to share with learners
- Record instructional videos to share with learners
- Share lessons and tasks with learners using a school learning platform
- Teach classes online
- Teach learners online and face to face at the same time
- None of the above or no technology was used

13. During the last 12 months, how often did you do the following activities?

Every day or almost every day | About once or twice a week | About once or twice a month | About once or twice a year | Never or almost never

- Use digital resources to create lesson plans
- Use digital resources to design tasks
- Use digital resources to find instructional materials
- Use digital resources to explore new teaching methods
- Use digital resources to assign learning tasks
- Use digital resources to enable student collaboration
- Use digital resources to provide feedback to students
- Use digital resources to provide access to instructional material for students who cannot physically attend class
- Use digital resources to communicate with parents or guardians
- Use online tools or computer-based testing to assess students' learning
- Use digital resources to share ideas or resources with colleagues
- Take part in professional communities of practice online

14. Did your school encourage you to use any digital resources for lesson planning and teaching? Yes | No

15. Which digital resources did your school encourage you to use?

- Virtual Learning Environment/LMS (E.g. Seesaw, Blackboard, Canvas Edmodo)

- School or community interactive platform (E.g. ClassDojo)
- Video conferencing tools (E.g. Zoom, Google Meet, Microsoft Teams, Skype)
- Digital textbooks
- Quiz tools
- Video resources (E.g. online/digital TV, YouTube)
- Audio resources (E.g. podcasts, audio recording, online/digital radio)
- Web-based resources (For example: Wikis, lesson plans, Other)
- Messaging and social media (For example: WhatsApp, SMS, Facebook, Messenger, other)
- Broadcast radio
- Broadcast television
- None of the above

16. Overall, how useful was the Virtual Learning Environment/LMS to your teaching?

Rating scale: 1| 2 | 3

- Overall, how useful was the School or community interactive platform to your teaching?
- Overall, how useful was the video conferencing tool to your teaching?
- Overall, how useful were the digital textbooks to your teaching?
- Overall, how useful were the quiz tools to your teaching?
- Overall, how useful were the video resources to your teaching?
- Overall, how useful were the audio resources to your teaching?
- Overall, how useful were the web resources to your teaching?
- Overall, how useful was messaging and social media to your teaching?
- Overall, how useful was broadcast radio to your teaching?
- Overall, how useful was broadcast TV to your teaching?

- Overall, how useful were the other digital resources used to your teaching?

Current teaching challenges.

17. To what extent is this school's capacity to provide quality instruction currently hindered by any of the following issues? Select one answer per row.

Not at all | To some extent | Quite a bit | a lot

- Shortage of qualified teachers
- Shortage or inadequacy of instructional materials (For example: textbooks)
- Shortage or inadequacy of digital technology for instruction (For example: software, computers, tablets, smart boards)
- Insufficient internet access
- Shortage of support personnel
- Shortage or inadequacy of instructional space (For example: classrooms)
- Shortage or inadequacy of physical infrastructure (For example: classroom furniture, school buildings, heating/cooling, and lighting)

Learning loss and teaching post COVID-19.

18. What are your experiences with learners in your class(es)?

Agree | Disagree | Don't know

- All students continued to progress their learning
- Some students have not progressed their learning
- No students have progressed their learning

a) You told us that some or none of your students have progressed their learning (or you didn't know). Have any of these things been affected?

Yes | No | Don't know

- Learners have less self-discipline or are less motivated to learn
- Learners' literacy skills have suffered
- Learners' numeracy skills have suffered

- Learners' communication and interpersonal skills have suffered
- Learners' confidence has suffered
- Learners' wellbeing has suffered
- Learners are finding it more difficult to pay attention during (in person or online) lessons
- Learners are choosing not to participate or they make less contribution in the lesson

a) Have you noticed anything else has been affected as a result of your students not being able to progress their learning during this time?

19. If your school reopened following closures for the COVID-19 pandemic, which of the following has taken place? Select all answers that apply to you.

- Assessment of students' learning levels
- The curriculum was adapted to meet students' learning levels
- Lessons focused on remediation/making up for lost learning
- None of the above

20. Have any of these groups of learners experienced more learning loss than other students?

- Learners from the financially poorest households (including food poverty)
- Learners with physical disabilities, learning difficulties or other special needs
- Learners who have been displaced from their home
- Learners whose mother tongue/first language is not the language of instruction
- Learners with less access to the internet or technology
- Learners who have experienced illness or bereavement in their families due to COVID- 19
- Learners who have experienced financial difficulty or unemployment in their families due to COVID-19
- Learners who had low levels of attainment prior to the pandemic

- Learners who have an unstable home background
- Learners whose parents/caregivers have been unable to support them in their lessons outside school (e.g. because they are working)
- Learners that you consider to be vulnerable or have other needs/special requirements

21. In your experience over the past 12 months, are any of these true?

a) Girls have experienced more learning loss than boys

Yes | No | Don't know

b) Parents/caregivers have prioritised boys learning over girls during lockdown

Yes | No | Don't know

c) Parents/caregivers prioritised older children's learning over learning of younger children

Yes | No | Don't know

d) Boys have experienced more learning loss than girls

Yes | No | Don't know

e) Single children have experienced more learning loss than children with many siblings

Yes | No | Don't know

f) Children with many siblings have experienced more learning loss than single children

Yes | No | Don't know

22. Have you noticed any other groups of learners who have had a poorer quality or reduced learning experience compared to others?

Yes | No | Don't know

23. What should your school do post COVID-19 in teaching, pedagogies or structurally to help learners to catch up? Select all answers that apply.

- Help learners understand how they can learn better and develop independent learning strategies
- Introduce more play in learning to reduce stress

- Give learners more time to practice and reflect, rather than relying solely on direct instruction
- Allow for more peer-to-peer learning and interaction in the classroom/remotely
- Engage parents/caregivers more frequently
- Add more hours or days to teaching time
- Provide more opportunities (time, financing, training) to use technologies for individualised learning
- Reduce class sizes
- Reduce administration to focus on teaching and learning
- Provide more direct instruction
- Focus on specific group(s) of marginalized/vulnerable learners who experienced learning loss
- Give teachers more autonomy to deliver lessons targeted to the learners' needs and learning levels
- Allow teachers more freedom in lesson planning
- Support socio-emotional learning
- Introduce remedial tutoring

24. What should governments do post-COVID-19 to address any loss of learning experienced?

- Promote the teaching profession in order to increase the number of teachers
- Focus on teacher recruitment and retention
- Support teachers' wellbeing
- Support teacher development/teacher training
- Revise curriculum
- **Provide digital access and devices for marginalised learners (e.g., learners from low- income households, SEND learners, girls, minority language learners)**

- **Provide more technology for individual learning by those who need more support**
- **Provide more materials for digital teaching and learning to schools**
- **Provide training and support for teachers to better integrate technology into education**
- Cancel exams and replace them with regular assessment and monitoring
- Collect learning outcomes data to monitor progress over the long term
- Provide support for socio-emotional learning Your professional learning.

25. During the past 12 months did you take part in any form of teacher professional development or training (organised or self-initiated)?

Yes | No

a) You told us that you took part in teacher development or training in the past 12 months. Who paid for the cost of it?

a) The school

b) the government

c) self-funded

b) You told us that you took part in teacher development or training in the past 12 months. What did it focus on?

- Using technology tools and resources for online or remote teaching and learning (including audio, video, broadcast radio and TV, WhatsApp, etc.)
- Pedagogies for online or remote teaching and learning
- Progress monitoring during remote learning
- Learner safeguarding online and during remote learning
- Safe online behaviour for teachers
- Understanding online learner behaviour
- Engaging parents/caregivers during remote learning
- Engaging in teacher communities of practice
- Teachers' physical, mental and/or emotional wellbeing

c) You told us that the focus of your professional development or training was the use of technology tools and resources for online teaching. What kind of tools or resources did you learn about?

- Virtual Learning Environment/LMS Â (E.g. Seesaw, Blackboard, Canvas Edmodo)
- Video conferencing tools (E.g. Zoom, Google Meet, Microsoft Teams, Skype)24
- Digital textbooks
- Quiz tools
- Video resources (E.g. online/digital TV, YouTube)
- Audio resources (E.g. podcasts, audio recording, online/digital radio)
- Web-based resources (E.g. Wikis, lesson plans, etc.)
- Messaging and social media (E.g. WhatsApp, SMS, Facebook)
- Broadcast media (E.g. radio, TV)
- School or community platforms (E.g. ClassDojo)

26. Think back across the (organised or self-initiated) professional development or training you experienced over the last 12 months (on any topic). Overall, to what extent did your practice change as a result?

Rating scale: 1 | 2| 3

27. How much time in total was spent on your professional development or training over the last 12 months? Add up the actual time you spent and answer in whole days.

28. An extensive global platform might be developed over the coming year where teachers can share classroom practices with others outside their regions. Would you consider using this to share teaching resources and lesson plans that you have created yourself?"

Yes | No

29. Which is NOT the type of school you teach at?

Public/State/Government funded/Charter/Academy school | Private school | Low-cost private school | Religious school | Charity or NGO funded school

Your needs as a teacher.

30. Which of the following areas could support your teaching in the next 12 months? Select up to five (5) answers maximum.

- Teaching online/remotely
- Caring for my mental health and wellbeing
- Developing skills and confidence in using digital technologies in teaching
- Subject/content knowledge for my own professional development
- Pedagogy/teaching methods for my own professional development
- Curriculum-related for my own professional development
- Integrating digital technologies into classroom practice
- Protected time during the working week for professional development and peer collaboration
- More interactive or engaging learning resources
- Assessment and monitoring of learners
- Safeguarding
- More administrative support
- More social or peer encouragement from people in your school
- Engaging in (remote) communities of practice with other educators
- Tackling gender issues related to learners' technology use
- Teaching/adapting to marginalised learners' needs (e.g. students with disabilities; minority language speakers; displaced, orphaned or otherwise vulnerable students)
- Coaching/mentoring
- No support needed

31. What further support could help you in the next 12 months?

32. Do you need more access to software or other (non-hardware) digital resources for the following tasks? Select one answer per row.

- My professional learning. Yes | No

- Planning lessons. Yes | No
- Assessment and evaluation. Yes | No
- Learners to use themselves (e.g. worksheets, quizzes, digital textbooks). Yes | No

33. Which of these statements best describes the quality of your teaching during the COVID-19 pandemic? Select one answer.

The experience has had no impact on your teaching quality | The experience has made you a better teacher | The experience has made you a worse teacher

34. How do you feel about teaching since the pandemic started?

About the same | Less enthusiastic | More enthusiastic

a) You told us you were more enthusiastic about teaching now. Why?

b) You told us you were less enthusiastic about teaching now. Why?

35. How would you describe the level of respect/esteem that parents/caregivers have for teachers since the pandemic started? Select one answer.

About the same | More respect/esteem | Less respect/esteem

36. How would you describe what has happened to your physical, mental and emotional wellbeing since the pandemic started? Select one answer.

My wellbeing has improved | My wellbeing has suffered | My wellbeing is about the same

37. Which of these statements best describes your current plans in the teaching profession?

I am undecided about my teaching plans | I plan to leave the teaching profession | I plan to remain a teacher

38. How likely are you to recommend teaching to friends, family or others?

Rating scale: 1 | 2 | 3